WHAT IS CLAIMED IS:

1. A superconducting article, comprising:

a substrate;

a buffer layer overlying the substrate;

a superconductor layer overlying the buffer layer; and

an electroplated stabilizer layer overlying the superconductor layer.

2. The superconducting article of claim 1, wherein the electroplated stabilizer layer comprises a non-noble metal.

3. The superconducting article of claim 2, wherein the non-noble metal comprises a material from the group consisting of copper, aluminum, and alloys thereof.

4. The superconducting article of claim 3, wherein the non-noble metal comprises copper.

5. The superconducting article of claim 1, wherein the electroplated stabilizer layer consists essentially of a non-noble metal.

6. The superconducting article of claim 1, wherein the buffer layer comprises a biaxially crystal textured film having generally aligned crystals both in-plane and out-of-plane of the film.

7. The superconducting article of claim 1, wherein the buffer layer comprises a barrier film.

8. The superconducting article of claim 1, further comprising a noble metal layer provided between the electroplated stabilizer layer and the superconductor layer.

9. The superconducting article of claim 8, wherein the noble metal layer comprises silver.

10. The superconducting article of claim 1, wherein the superconductor layer comprises a high temperature superconductor material, having a critical temperature T_c not less than about 77 °K.

11. The superconducting article of claim 1, wherein the superconductor material comprises $REBa_2Cu_3O_{7-x}$, wherein RE is a rare earth element.

12. The superconducting article of claim 11, wherein the superconductor material comprises $YBa_2Cu_3O_7$.

13. The superconducting article of claim 1, wherein the electroplated stabilizer layer has a thickness within a range of about 1 to 1000 microns.

14. The superconducting article of claim 1, wherein the electroplated stabilizer layer has a thickness within a range of about 10 to 200 microns.

15. The superconducting article of claim 1, wherein the article is in the form of a superconducting tape.

16. The superconducting article of claim 15, wherein the substrate has an aspect ratio of not less than 10^3.

17. The superconducting article of claim 15, wherein the substrate has an aspect ratio of not less than 10^4.

18. The superconducting article of claim 15, wherein the substrate includes first and second opposite surfaces, and the electroplated stabilizer layer includes first and second electroplated stabilizer layers respectively overlying the first and second opposite surfaces of the substrate.

19. The superconducting article of claim 18, wherein the first and second electroplated stabilizer layers extend so as to define first and second side surfaces of the superconducting tape and encapsulate the superconducting tape.

20. The superconducting article of claim 19, wherein the first and second electroplated stabilizer layers form a convex contour along at least a portion of the side surfaces of the superconducting article.

21. The superconducting article of claim 15, wherein the superconducting article has a dual-sided structure, the substrate having first and second surfaces that are opposite each other, the buffer layer includes first and second buffer layers that respectively overlie the first and second surfaces of the substrate, the superconductor layer includes first and second superconductor layers overlying the first and second buffer layers respectively, and the electroplated stabilizer layer includes first and second electroplated stabilizer layers respectively overlying the first and second superconductor layers.

22. The superconducting article of claim 1, wherein the electroplated stabilizer layer is adhered without incorporation of a bonding layer.

23. The superconducting article of claim 1, wherein the electroplated stabilizer layer is adhered without incorporation of a solder layer.

24. The superconducting article of claim 1, wherein the article is a power cable, the power cable including a plurality of superconductive tapes, each tape comprising said substrate, said buffer layer, said superconductor layer, and said electroplated stabilizer layer.

25. The superconducting article of claim 24, further comprising a conduit for passage of coolant fluid.

26. The superconducting article of claim 25, wherein the superconductive tapes are wrapped around the conduit.

27. The superconducting article of claim 24, wherein the power cable comprises a power transmission cable.

28. The superconducting article of claim 24, wherein the power cable comprises a power distribution cable.

29. The superconducting article of claim 1, wherein the article is a power transformer, the power transformer comprising a primary winding and a secondary winding, wherein at least one of the primary winding and secondary winding comprises a wound coil of superconductive tape, the superconductive tape comprising said substrate, said buffer layer, said superconductor layer, and said electroplated stabilizer layer.

30. The superconducting article of claim 29, wherein the secondary winding has a fewer number of windings than the primary winding, for reducing voltage.

31. The superconducting article of claim 29, wherein the primary winding has a fewer number of windings than the secondary winding, for increasing voltage.

32. The superconducting article of claim 1, wherein the article is a power generator, comprising a shaft coupled to a rotor comprising electromagnets containing rotor coils, and a stator comprising a conductive winding surrounding the rotor, wherein at least one of the winding and the rotor coils comprises a superconductive tape comprising said substrate, said buffer layer, said superconductor layer, and said electroplated stabilizer layer.

33. The superconducting article of claim 1, wherein the article is a power grid, the power grid comprising:

a power generation station comprising a power generator;

a transmission substation comprising a plurality of power transformers for receiving power from the power generation station and stepping-up voltage for transmission;

a plurality of power transmission cables for transmitting power from the transmission substation;

a power substation for receiving power from the power transmission cables, the power substation comprising a plurality of power transformers for stepping-down voltage for distribution; and

a plurality of power distribution cables for distributing power to end users, wherein

at least one of the power distribution cables, power transmission cables, transformers of the power substation, transformers of the transmission substation, and the power generator comprises a plurality of superconductive tapes, each superconductive tape comprising said substrate, said buffer layer, said superconductor layer, and said electroplated stabilizer layer.

34. A method for forming a superconducting tape, comprising:

providing a substrate;

depositing a buffer layer overlying the substrate;

depositing a superconductor layer overlying the buffer layer; and

electroplating a stabilizer layer overlying the superconductor layer.

35. The method of claim 34, wherein electroplating is carried out by passing the superconducting tape through an electroplating solution, wherein the tape is biased to form a cathode, an anode is provided in the solution.

36. The method of claim 35, wherein the stabilizer layer comprises a non-noble metal.

37. The method of claim 36, wherein the non-noble metal comprises copper.

38. The method of claim 37, wherein the solution comprises copper sulfate.

39. The method of claim 35, wherein the superconducting tape is passed through the solution by a reel-to-reel process.

40. The method of claim 34, wherein electroplating is carried out such that the stabilizer layer overlies one side of the substrate.

41. The method of claim 34, wherein electroplating is carried out such that the stabilizer layer overlies first and second opposite sides of the substrate.

42. The method of claim 34, wherein electroplating is carried out such that the stabilizer layer encapsulates the substrate, buffer layer, and the superconductor layer.

43. A method of laying power cable, comprising:

providing a coil of power cable, the power cable comprising a plurality of superconductive tapes, each tape comprising a substrate, a buffer layer overlying the substrate, a superconductor layer overlying the buffer layer, and an electroplated stabilizer layer overlying the superconductor layer; and

unwinding the coil while inserting the power cable into a conduit, wherein the conduit is an underground utility conduit.